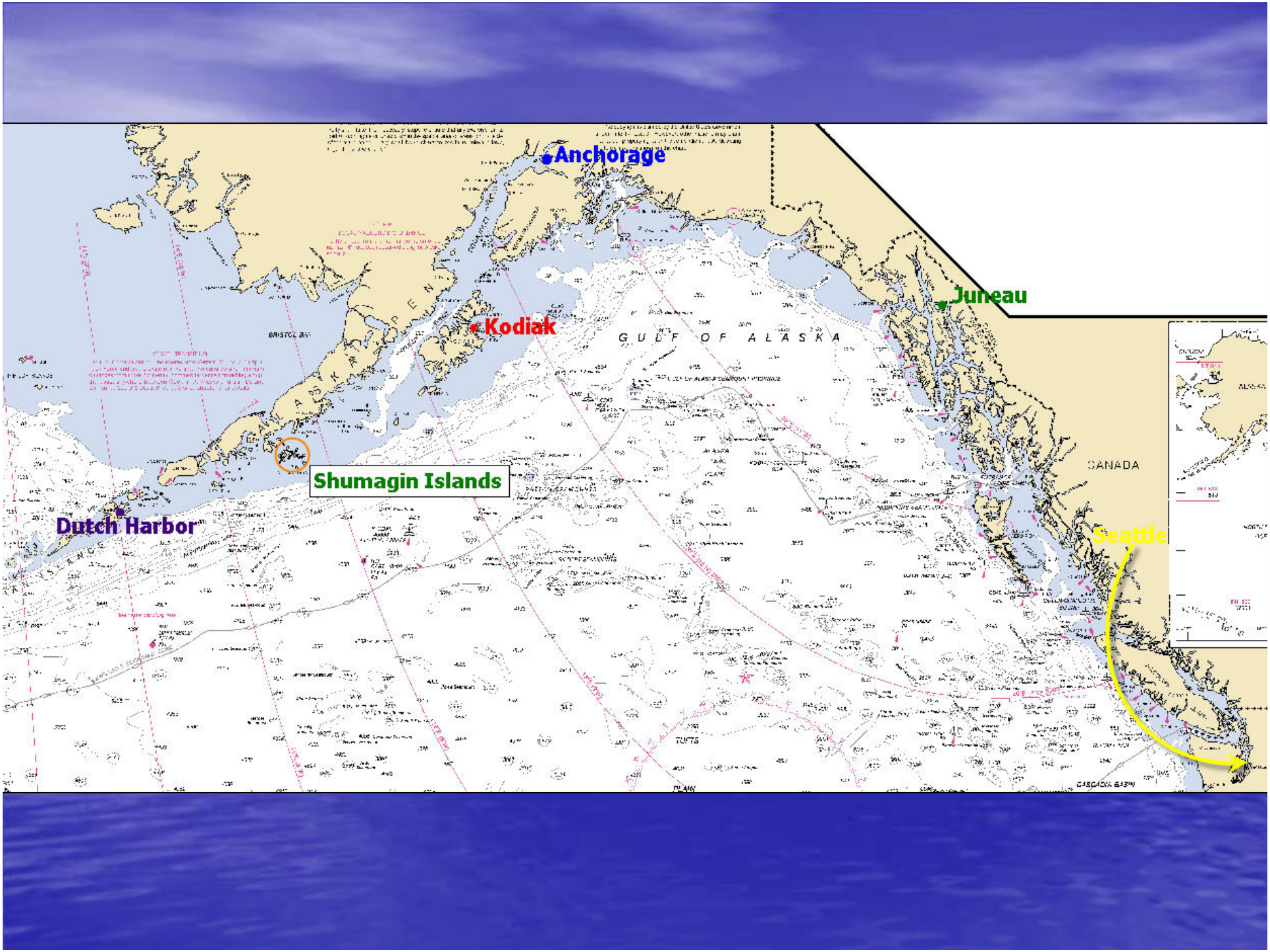
Downslope Winds off the Alaska Peninsula

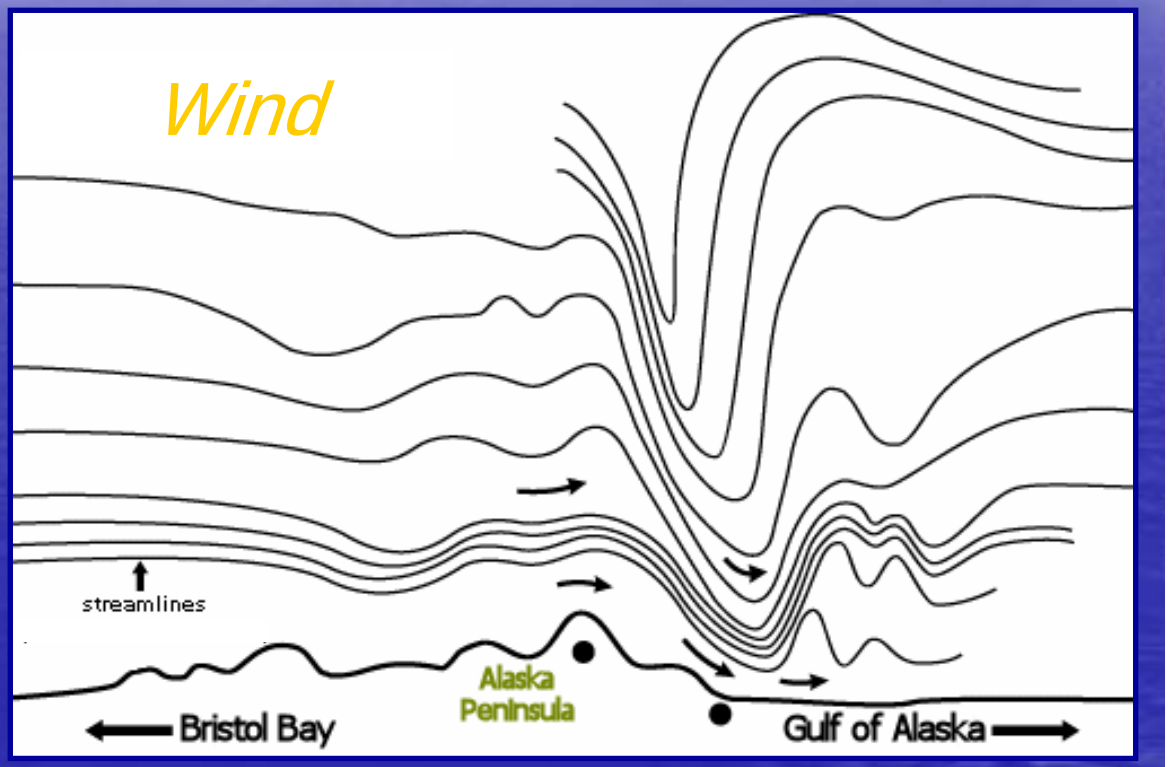
LTjg Matt Glazewski, NOAA
Weather Officer, NOAA Ship FAIRWEATHER

NOAA Ship FAIRWEATHER (S220)
In front of Mount Fairweather,
October 28, 2006

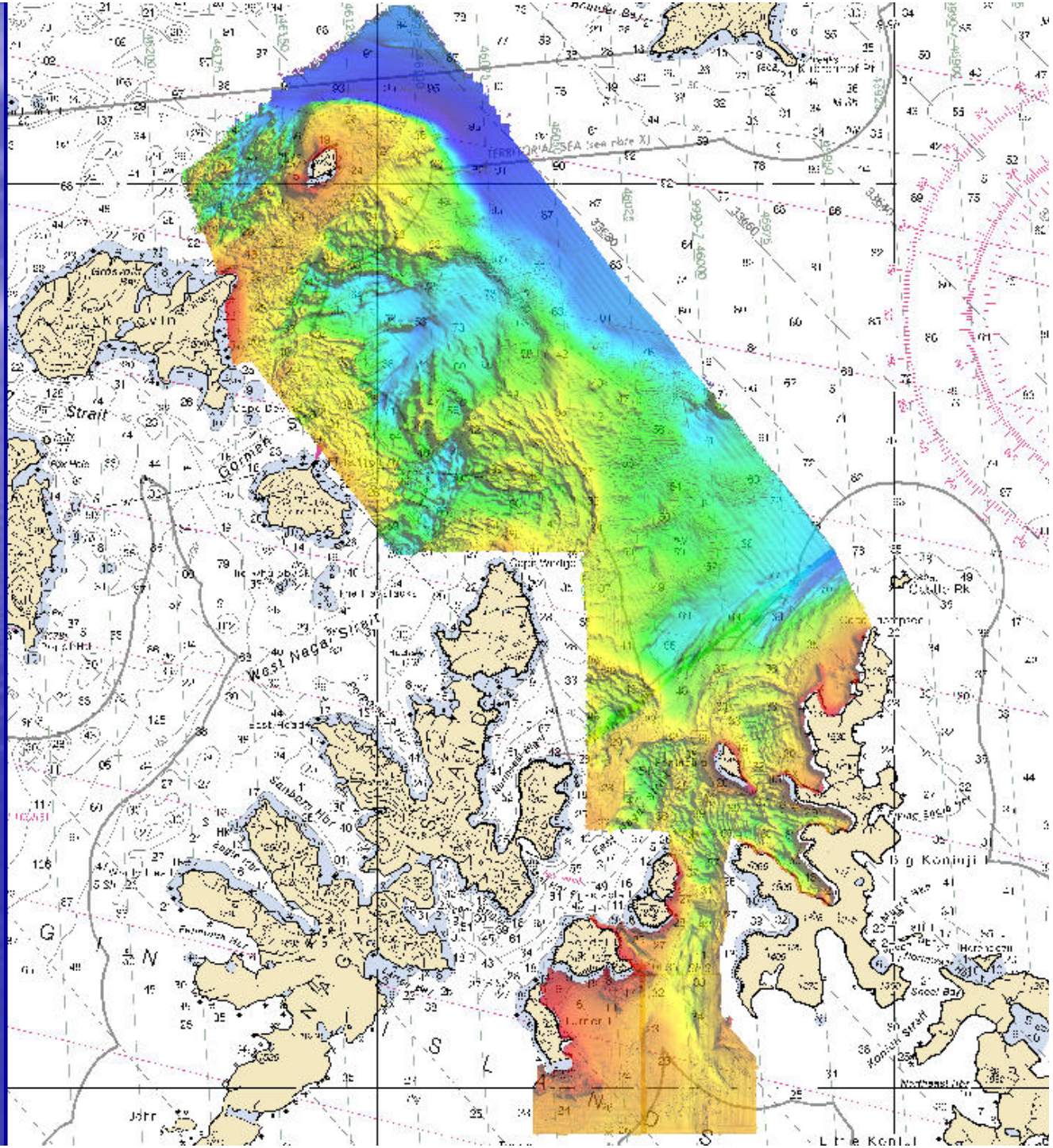

Anchorage
Juneau
Kodiak
GULF OF ALASKA
CANADA
Shumagin Islands
Dutch Harbor
Seattle

Downslope Winds, SW Alaska Peninsula

While working in the Shumagin Islands from May – August 2007, Fairweather (FA) experienced over 14 downslope wind event days



Shumagin Islands



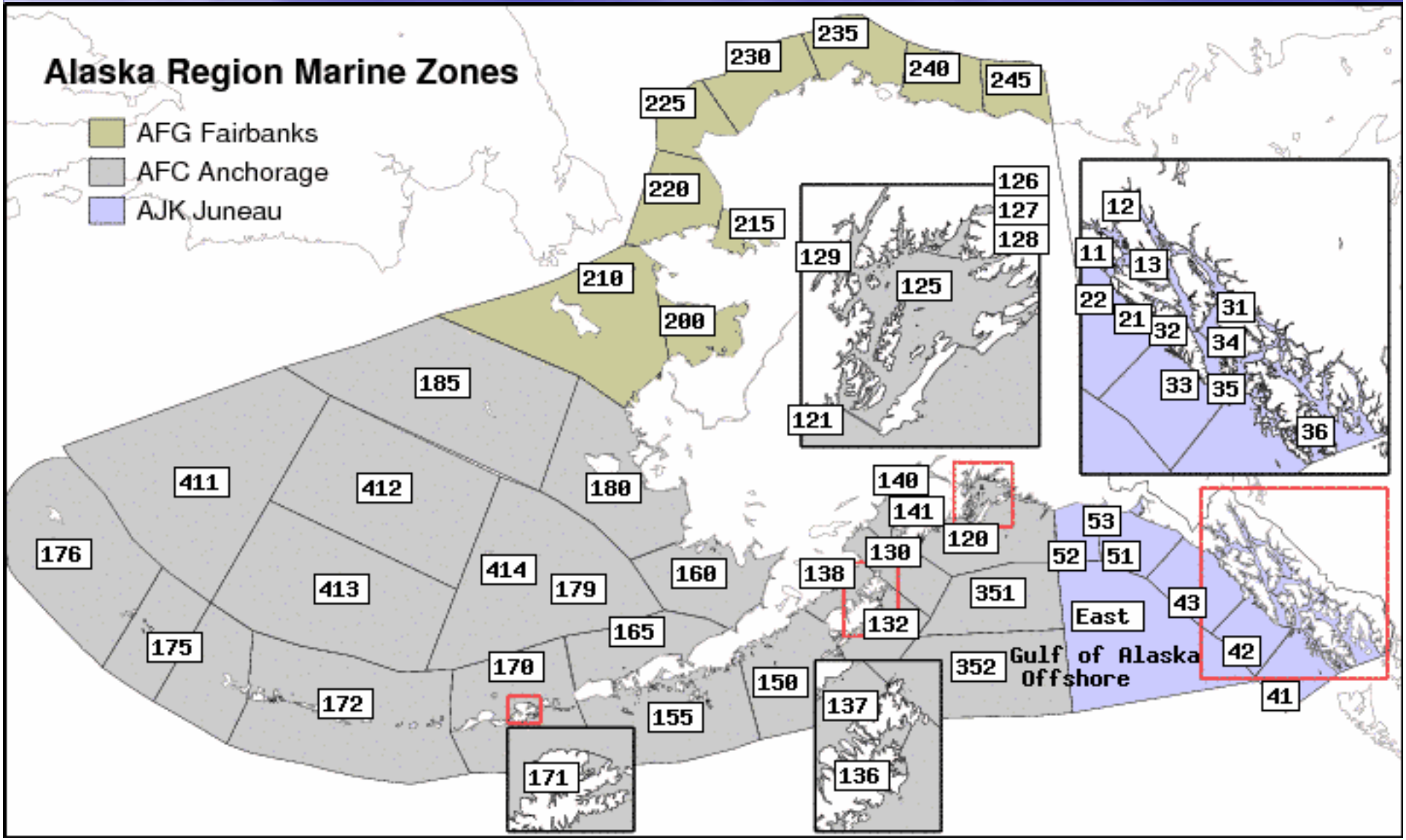
Pavlof Volcano & Pavlof Sister – Alaska Peninsula

June 2007

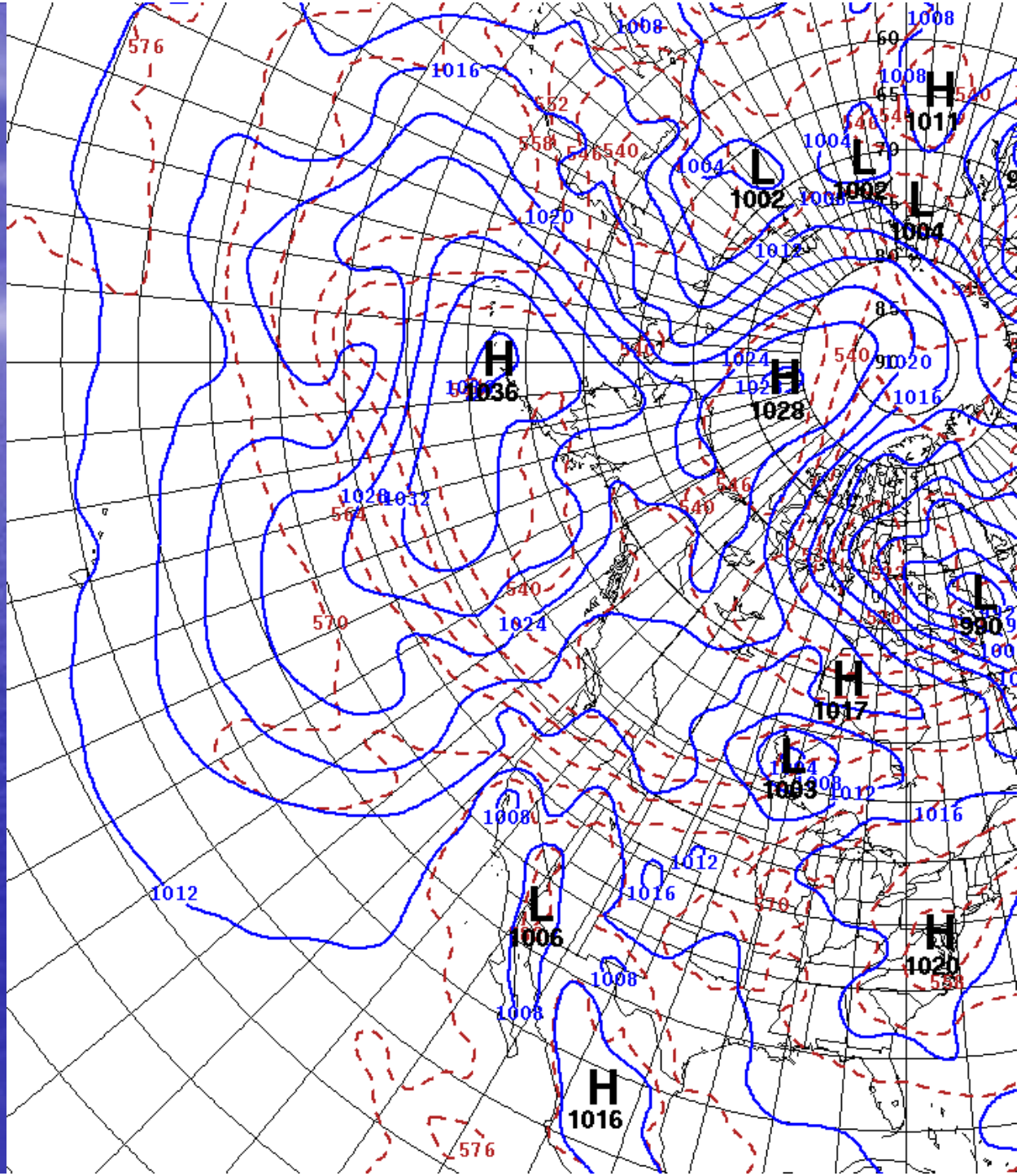
Sunset over Nagai Island – Shumagin Group

July 2007

NWS Alaska Region Sea Zones



15 June 2007



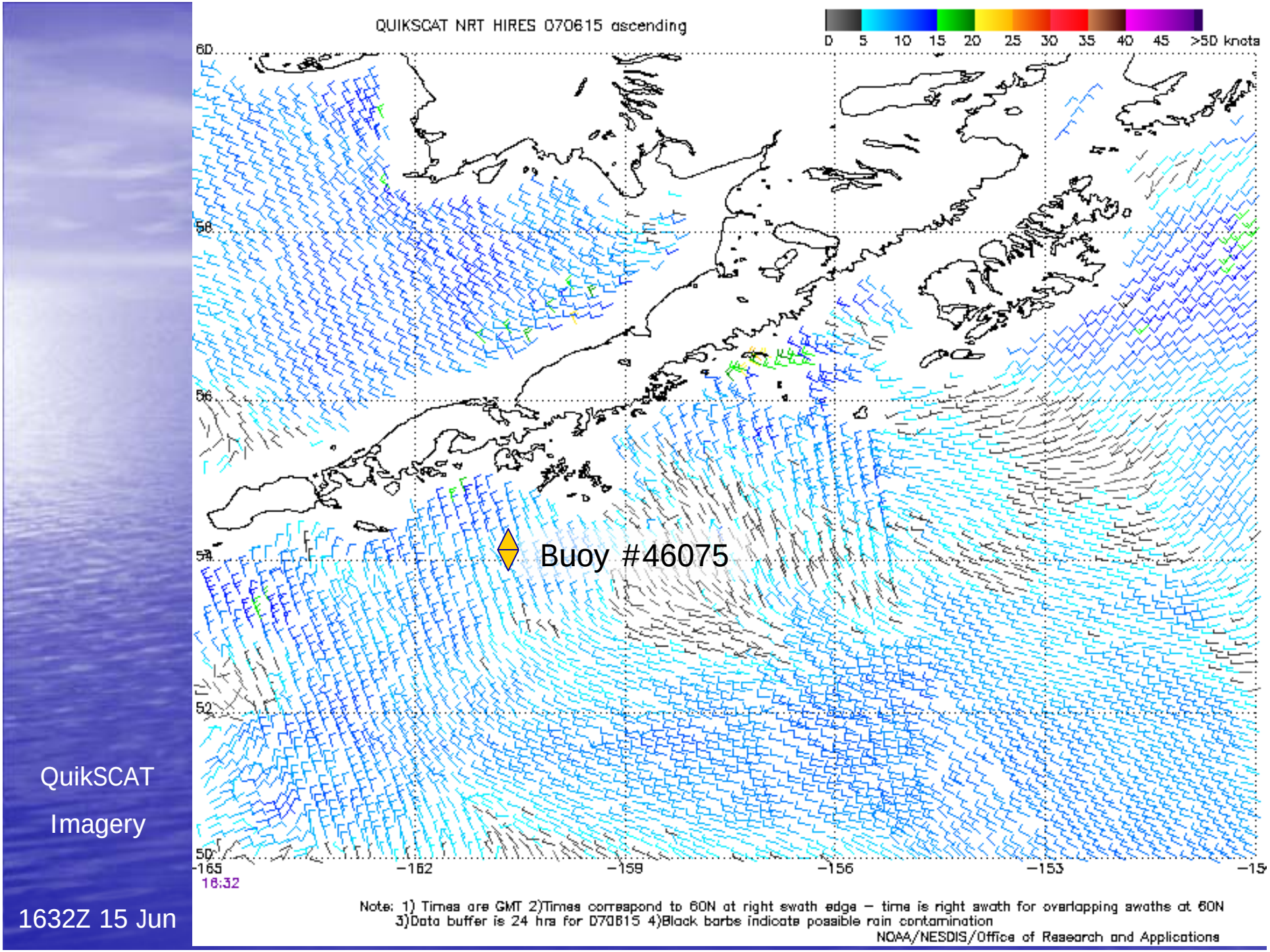
NCEP Surface Reanalysis: 15Jun 12Z

FA Weather Log: 15 June

TIME	POSITION (Lat. and Long.)	PRESENT WEATHER	VISIBILITY (N.M.)	WIND		SEA WAVE HEIGHT (Ft.)	SWELL WAVES		SEA WATER TEMP. °C	SEA LEVEL PRESSURE (mb)	TEMPERATURE °C	
				DIR. (True)	SPEED (Kts.)		DIR. (True)	HEIGHT (Ft.)			DRY BULB	WET BULB
01	55° 24.9 N' 160° 07.8 W'	OVC	10	340	17	1-2	—	—	-	1031.8	8.0	7.0
02	55° 24.9 N' 160° 07.8 W'	OVC	10	360	13	1-2	-	—	-	1031.7	7.9	6.8
03	55° 24.9 N' 160° 07.8 W'	OVC	10	340	17	1-2	-	—	-	1031.7	7.4	6.3
04	55° 24.4' N 164° 07.8' W	MC	10	340	16	<1	350	<1	-	1032.0	7.5	6.5
05	55° 24.9' N 164° 07.8' W	PC	10+	330	12	<1	350	<1	-	1032.0	7.5	6.5
06	55° 24.9' N 164° 07.8' W	MCLR	10+	330	20	<1	350	<1	-	1032.0	7.0	6.0
07	55° 24.9' N 164° 07.8' W	MCLR	10+	330	20	<1	350	<1	-	1032.1	7.0	6.0
08	55° 24.00' N 166° 07.31' W	MCLR	10+	325	20	1	350	1	—	1031.6	8.2	6.9
09	55° 24.41' N 166° 07.30' W	MCLR	10+	330	20	<1	350	<1	—	1032.1	10.0	8.3
10	55° 24.98' N 166° 07.82' W	PC	10+	340	15	<1	350	<1	—	1032.5	11.8	9.6
11	55° 24.91' N 166° 07.70' W	PC	10+	330	22	<1	350	<1	—	1032.1	11.7	8.1
12	55° 24.9 N' 160° 07.8 W'	MC	10	340	33	2	350	1	—	1032.3	9.0	7.3
13	55° 24.9 N' 160° 07.9 W'	PC	10	315	26	1-2	350	1	—	1032.2	10.0	8.3
14	55° 24.9 N' 160° 07.8 W'	PC	10	320	19	1-2	350	1	—	1031.6	10.0	8.0
15												
16	55° 20.5' N 160° 11.3' W	PC	10+	000	15	2	—	—	—	1033.3	11.0	8.9
17	55° 17.3' N 159° 49.9' W	MCLR	10+	310 ~~330~~	22	2	—	—	—	1031.3	15.5	12.5
18	~~350~~											
19	55° 08.1' N 159° 47.3' W	MCLR	10+	340	26	2	—	—	—	1031	16.0	13.0
20	55° 07.17' N 159° 50.54' W	MCLR	10+	340	17	4	—	4	—	1030.9	11.7	9.6
21	55° 07.18' N 159° 50.51' W	MCLR	10+	010	20	4	—	4	—	1030.7	12.2	8.9
22	55° 07.17' N 159° 50.52' W	MCLR	10+	~~040~~	20	4	—	4	—	1031.0	11.0	8.9
23	55° 07.16' N 159° 50.52' W	MCLR	10+	340	18	4	—	4	—	1030.7	10.0	8.3
24	55° 07.18 N' 159° 50.50 W'	MCLR	10	340	14	0-1	—	—	—	1031.2	9.0	7.4

Gusts not logged, but ship anemometers read as high as 55kts

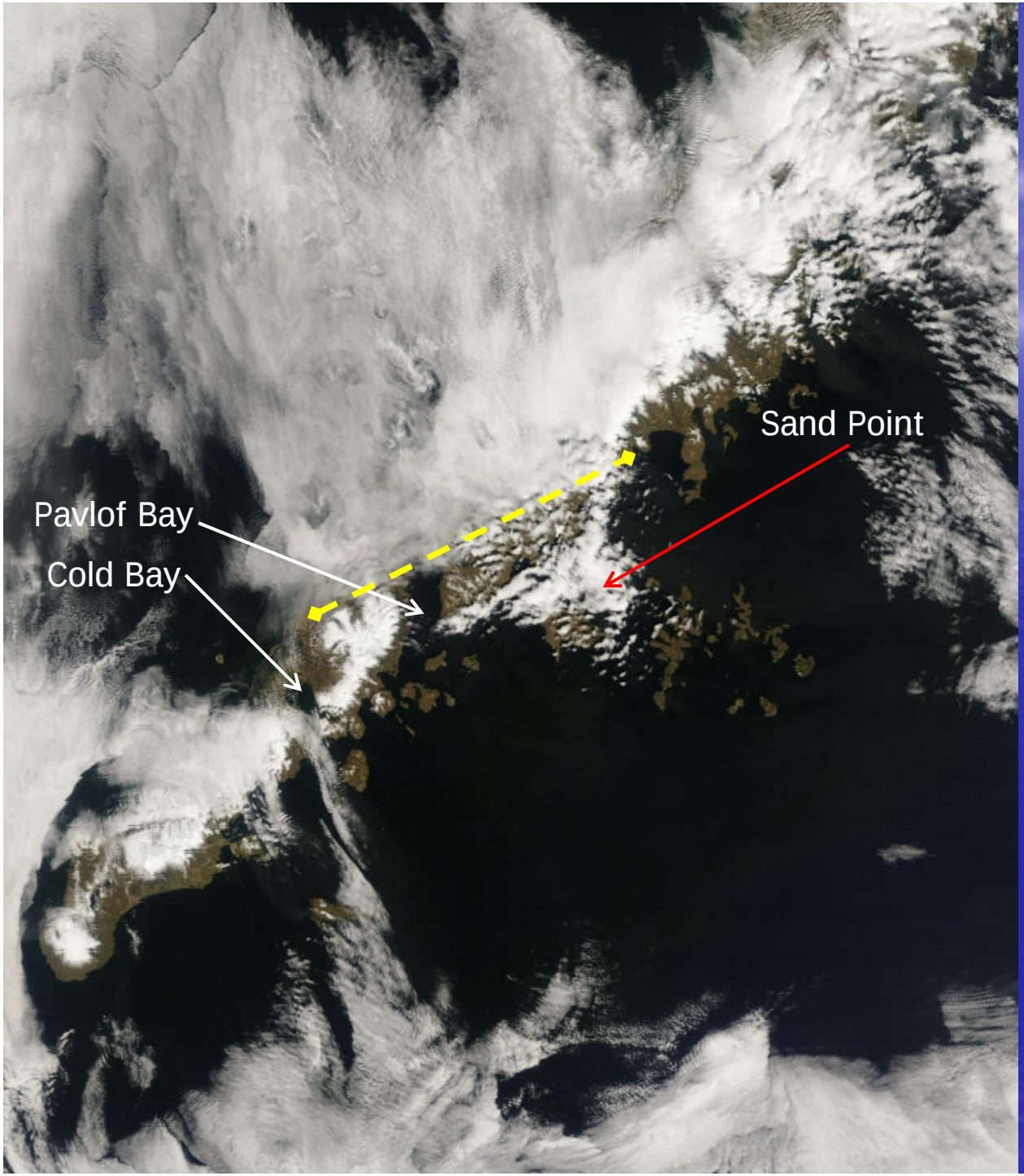
Ship dragged anchor, was forced to relocate anchorages



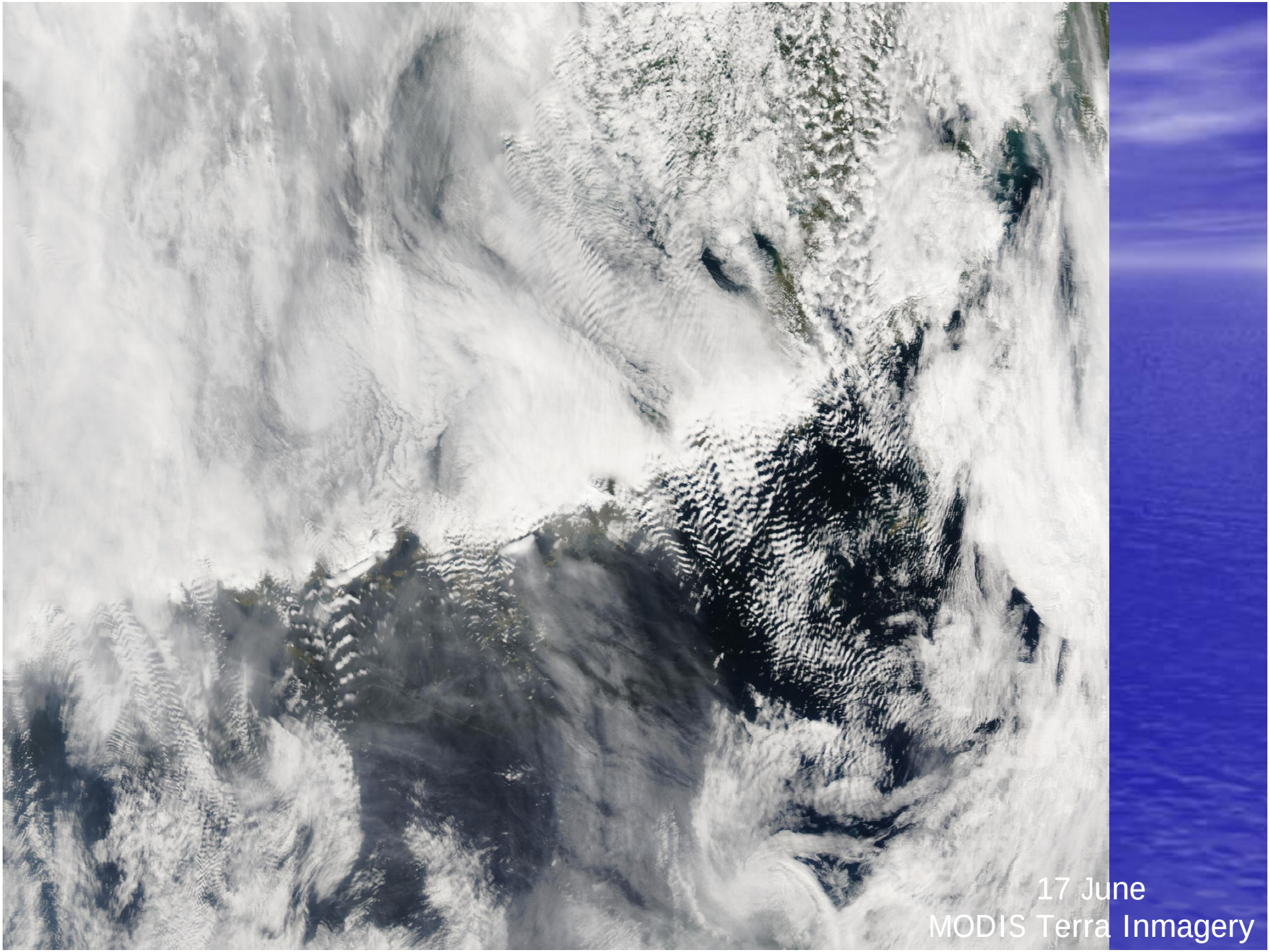
QuikSCAT

Imagery

1632Z 15 Jun



MODIS Aqua imagery: 15 June

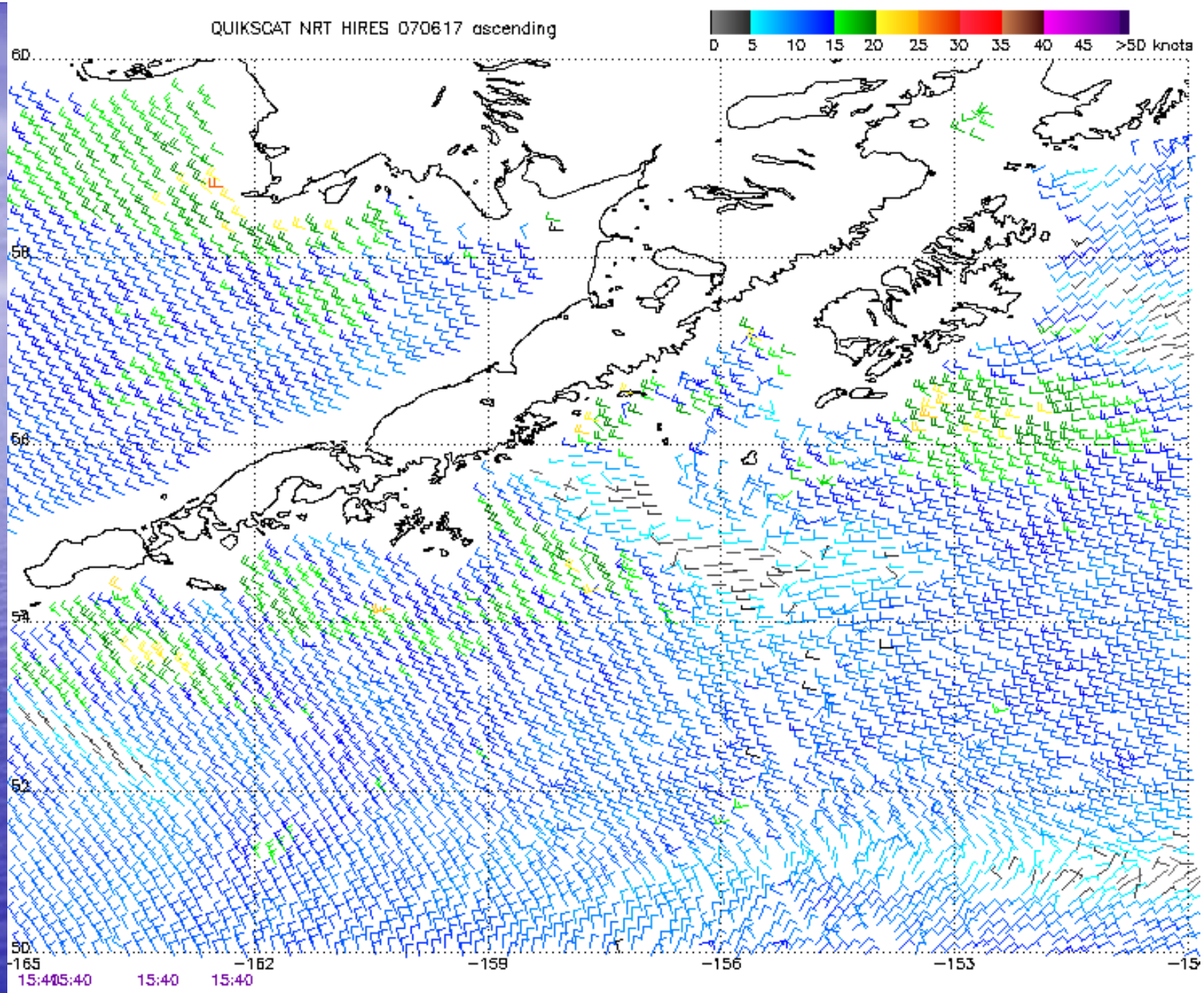

17 June
MODIS Terra Inmagery

21 June Larsen Bay, Nagai Island – Shumagin Group

QuikSCAT

Imagery

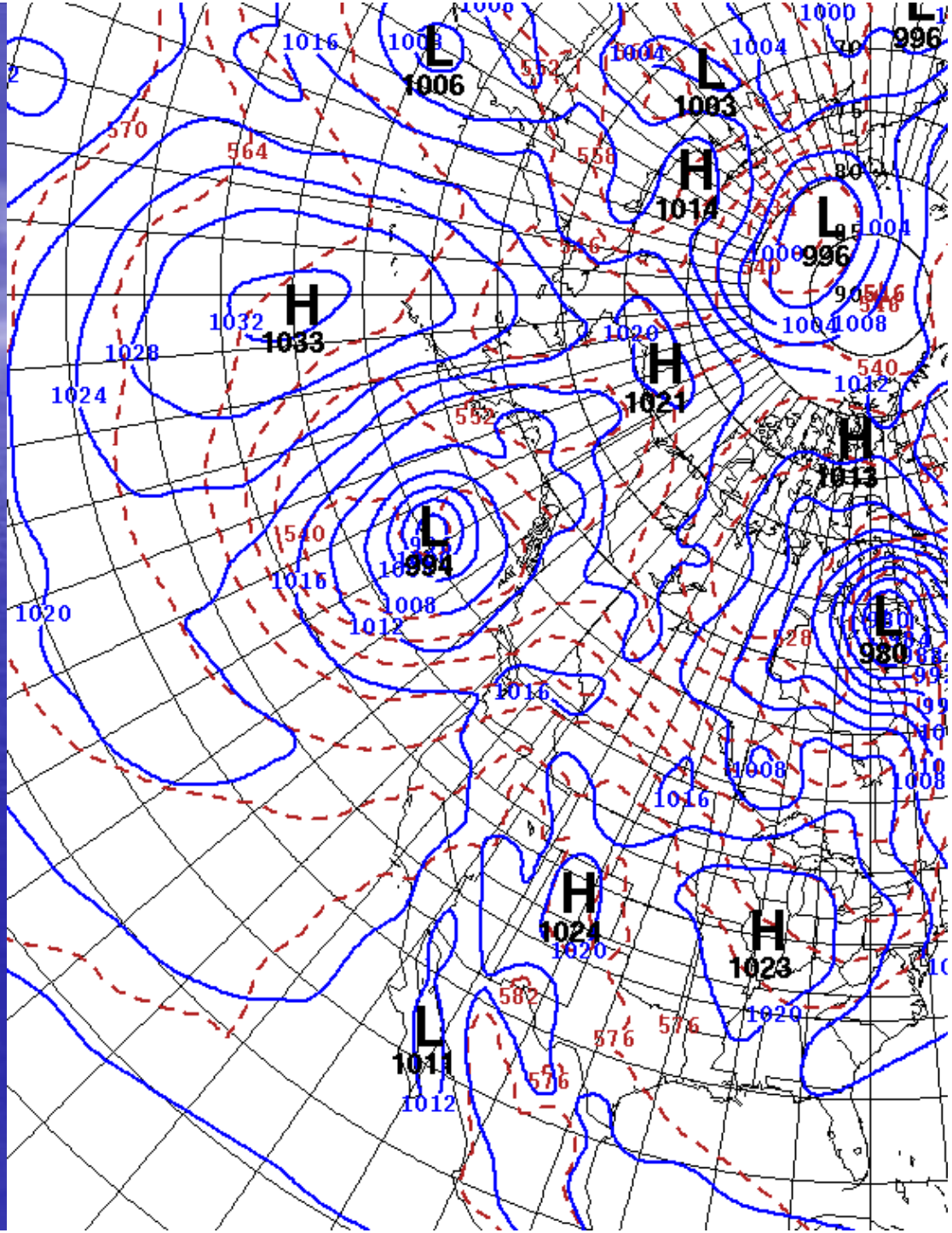
1540Z 17 Jun



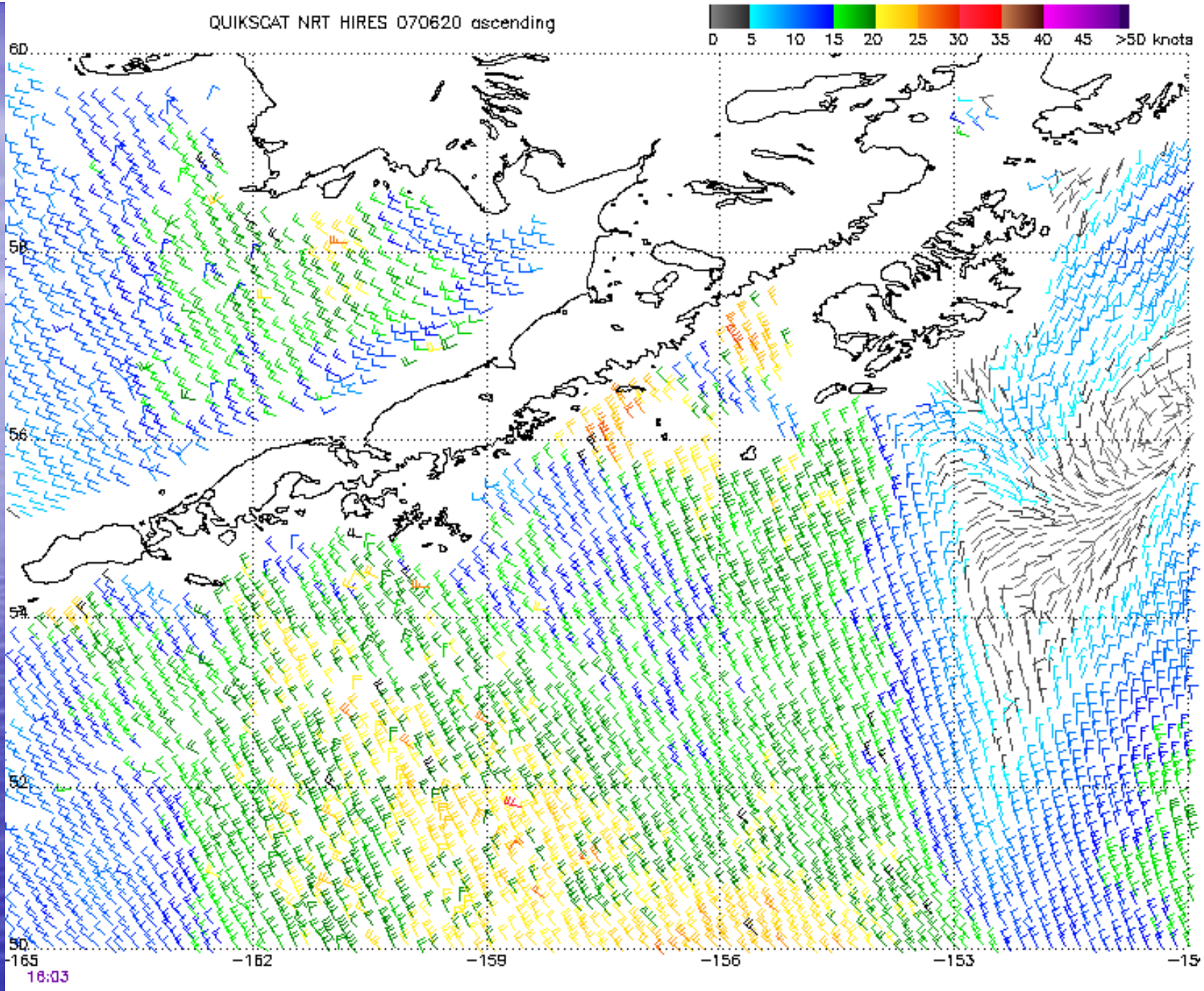
Example Thus Far

- From June 15-20
  - Accelerated wind localized in proximity to AK peninsula
  - Large ridge of High pressure to West
- From June 20-24
  - Low developed over AK peninsula/W Gulf, gradient with broad high to SW
  - Wind gradient more widespread across western Gulf as a whole
  - Atmosphere more unstable

20 June 2007



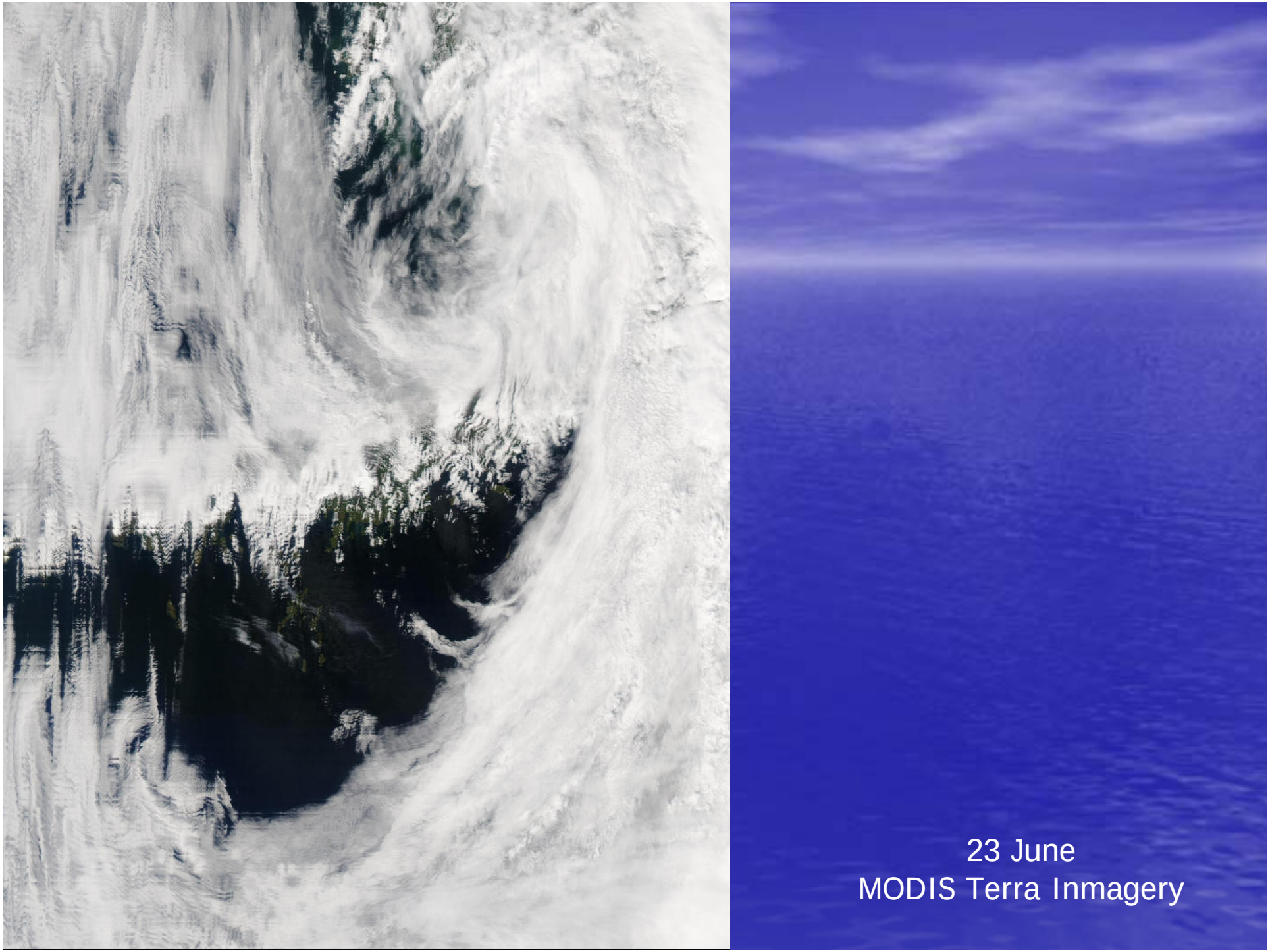
NCEP Surface Reanalysis: 20Jun 12Z



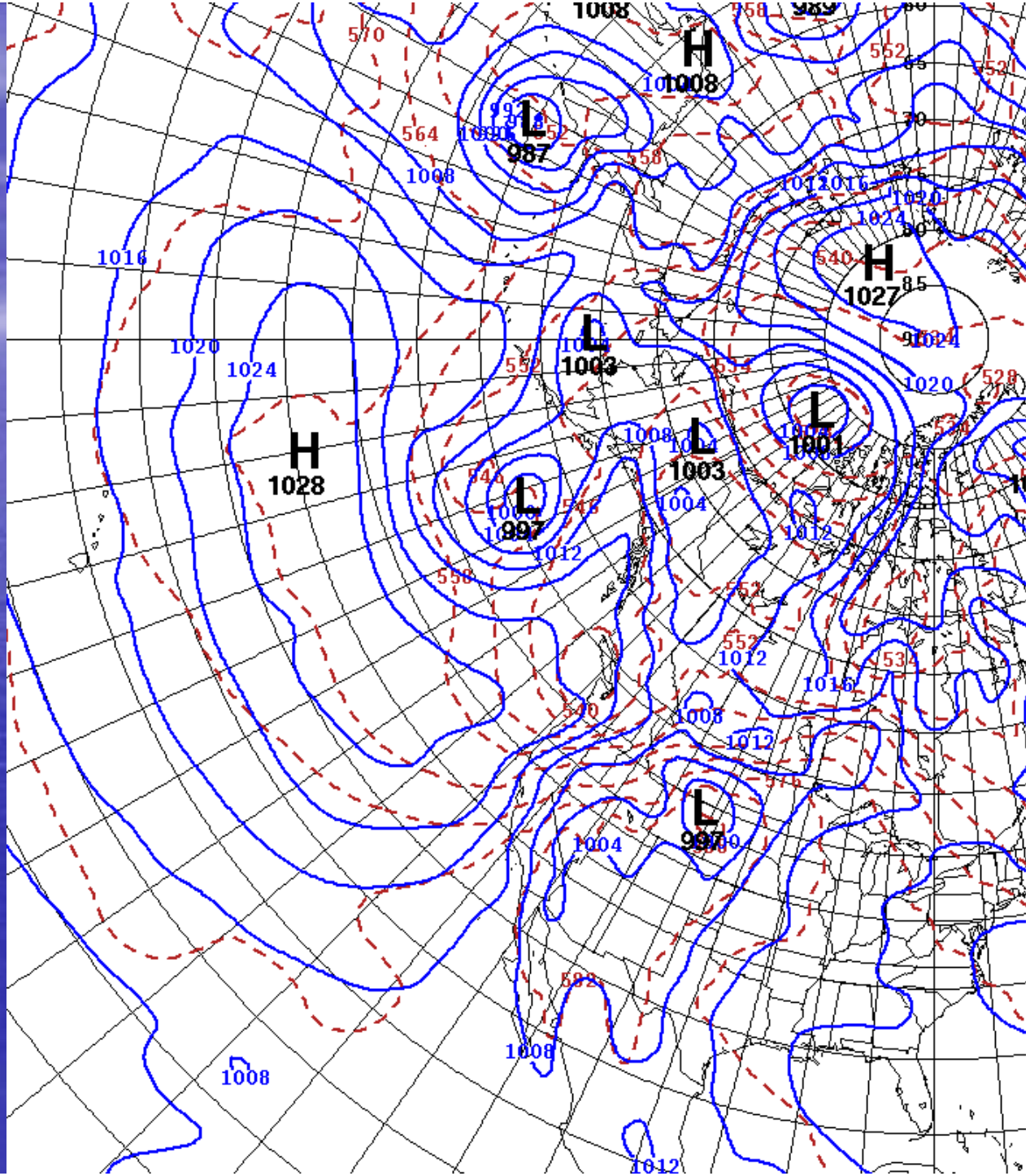
QuikSCAT

Imagery

1603Z 20 Jun


23 June
MODIS Terra Inmagery

24 June 2007



NCEP Surface Reanalysis: 25 Jun 00Z

FA Weather Log: 24 June

TIME	POSITION (Lat. and Long.)	PRESENT WEATHER	VISIBILITY (N.M.)	WIND		SEA WAVE HEIGHT (Ft.)	SWELL WAVES		SEA WATER TEMP. °C	SEA LEVEL PRESSURE (mb)	TEMPERATURE °C	
				DIR. (True)	SPEED (Kts.)		DIR. (True)	HEIGHT (Ft.)			DRY BULB	WET BULB
01	55°26.2'N 160°07.5'W	PC	10+	300	25	4	–	<1	–	1006.7	7.8	6.5
02	55°26.2'N 160°07.5'W	PC	10+	300	28	1	–	<1	–	1006.6	7.5	6.5
03	55°26.2'N 160°07.5'W	PC	10+	300	35	1-2	–	–	–	1007.0	7.0	6.0
04	55°26.27'N 160°07.5'W	MCLR	10+	350	30	1-2	–	0	–	1007.0	7.0	6.0
05	55°26.27'N 160°07.5'W	MCLR	10+	340	32	1-2	–	0	–	1007.4	7.0	6.0
06	55°26.27'N 160°07.5'W	MCLR	10+	335	30	1-2	–	0	–	1007.5	7.0	6.0
07	55°26.27'N 160°07.5'W	MCLR	10+	335	30	1-2	–	0	–	1007.4	7.0	6.0
08	55°26.3'N 160°07.5'W	PC	10+	335	30	2	–	0	–	1007.4	7.0	6.0
09	55°28.3'N 160°07.0'W	PC	10+	305	30	3	–	0	–	1007.9	7.0	6.0
10	55°32.0'N 160°03.0'W	PC	10+	325	24	3	–	0	–	1007.4	8.1	6.8
11	55°31.3'N 160°03.8'W	MC	10+	315	23	1	320	3	–	1007.9	8.3	7.1
12	55°29.0'N 160°05.0'W	MC	10+	300	24	2	320	3	–	1007.4	8.3	7.0
13	55°30.3'N 160°06.1'W	MC	10+	310	18	2	320	3	–	1008.0	8.3	7.0
14	55°30.0'N 160°07.7'W	MC	10+	310	18	1	330	3	–	1008.6	9.3	7.9
15	55°28.3'N 160°06.5'W	MC	10+	300	13	1	320	1	–	1008.6	9.1	7.8

Well into the early morning hours, wind sustained over 30kts, gusts over 50kts

24 June, Karpa Island – Shumagin Group

Cap Cloud & Lenticular Clouds

Mountain Wave Clouds

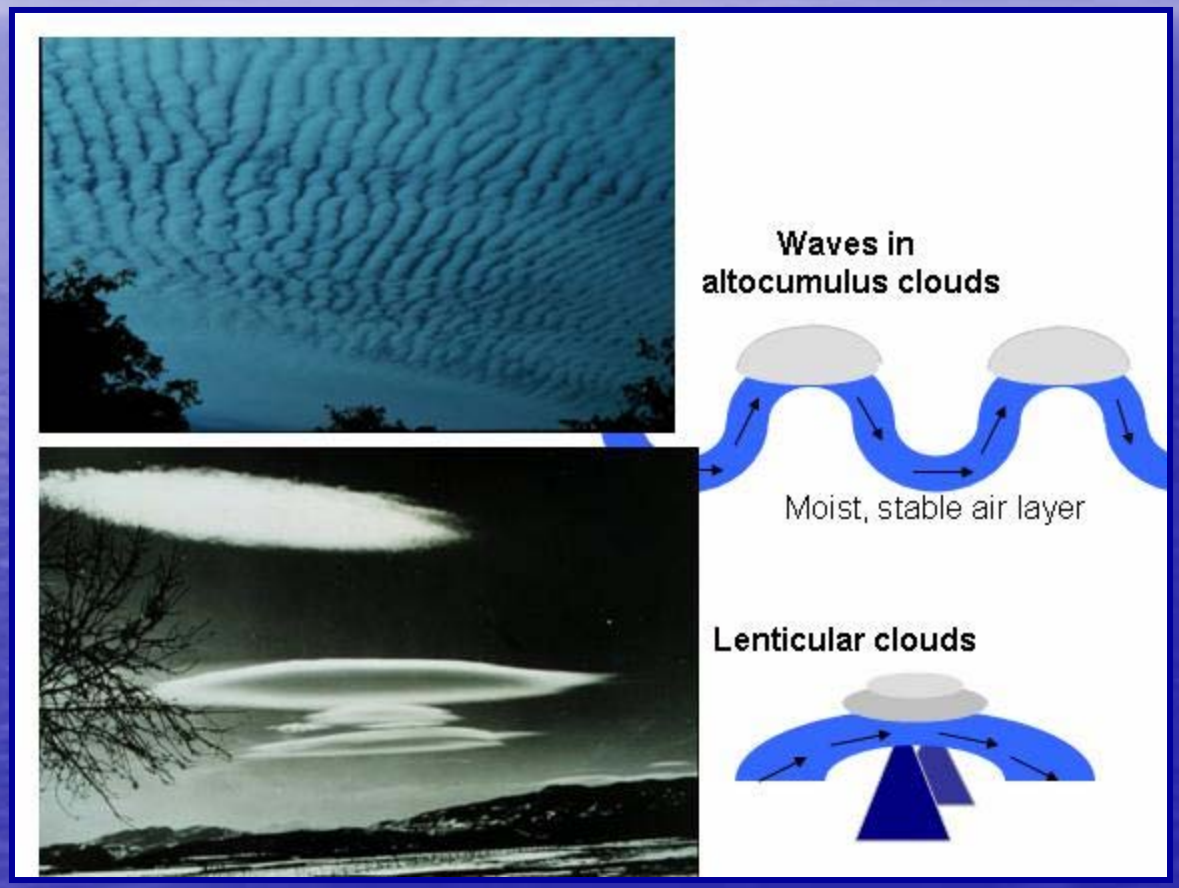
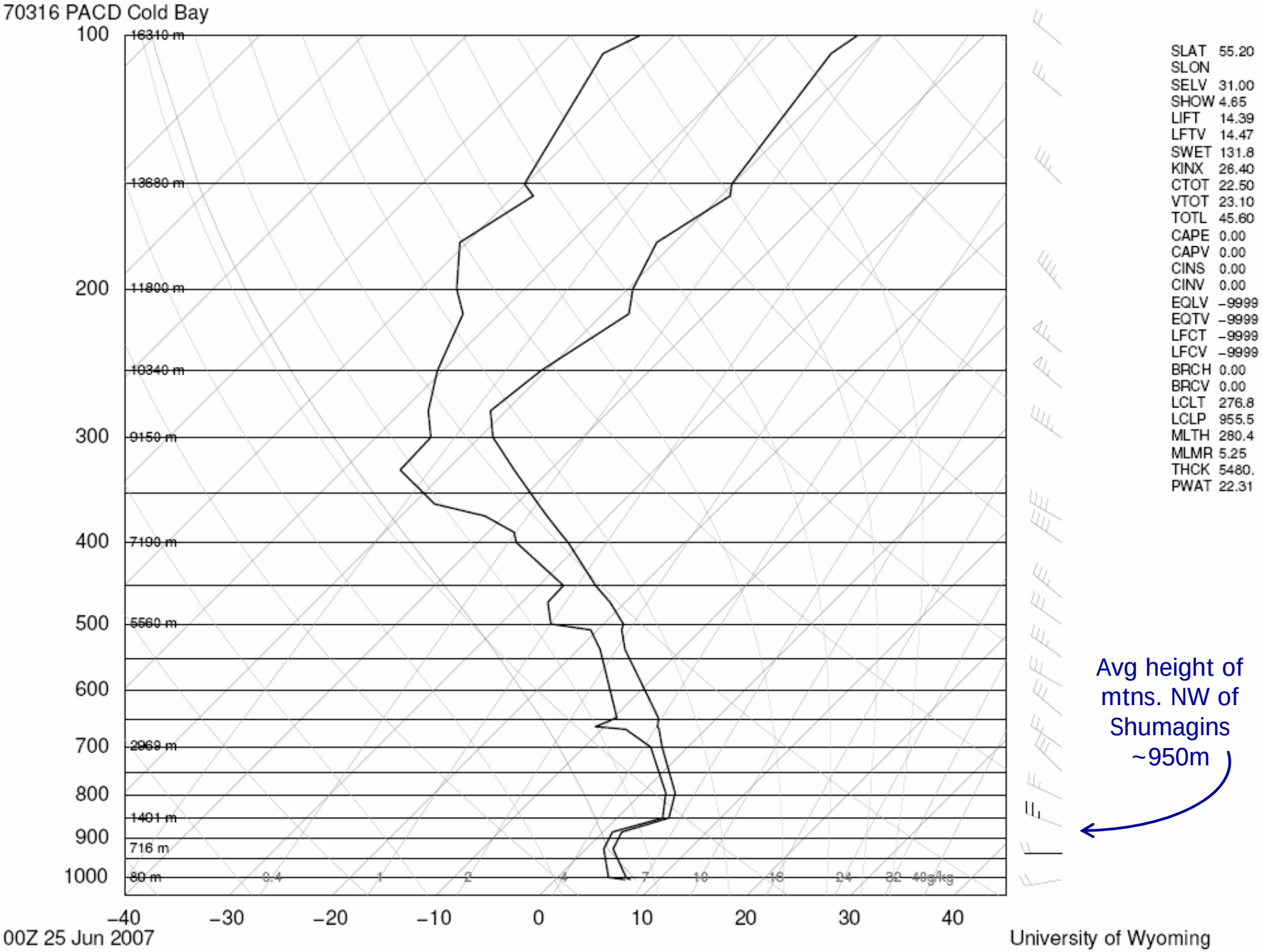


Image from NWS WRH


70316 PACD Cold Bay
100
200
300
400
500
600
700
800
900
1000
16310 m
13680 m
11800 m
10340 m
9150 m
7190 m
5560 m
2969 m
1491 m
716 m
80 m
0.4
1
2
4
7
10
16
24
32
40g/kg
−40
−30
−20
−10
0
10
20
30
40
00Z 25 Jun 2007
University of Wyoming
SLAT 55.20
SLON
SELV 31.00
SHOW 4.65
LIFT 14.39
LFTV 14.47
SWET 131.8
KINX 26.40
CTOT 22.50
VTOT 23.10
TOTL 45.60
CAPE 0.00
CAPV 0.00
CINS 0.00
CINV 0.00
EQLV −9999
EQTV −9999
LFCT −9999
LFCV −9999
BRCH 0.00
BRCV 0.00
LCLT 276.8
LCLP 955.5
MLTH 280.4
MLMR 5.25
THCK 5480.
PWAT 22.31
Avg height of mtns. NW of Shumagins ~950m

Concluding Observations

- Separate cases of downslope wind:
  - More stable atmosphere (High to W)
  - Unstable/less stable atmosphere (Low to E)
- Intensity
  - Can be locally violent in both scenarios
  - Potential to be more volatile when associated with unstable/less stable atmosphere

Questions?